

Gökçe Başar

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Academic Appointments

Assistant Professor, University of North Carolina, Chapel Hill, NC, 2019 - current

Visiting Research Assistant Professor, University of Illinois, Chicago, IL, 2017 - 2019

Postdoctoral Research Associate, Maryland Center for Fundamental Physics, University of Maryland, MD, 2014 - 2017

Postdoctoral Research Associate, Stony Brook University, Stony Brook, NY, 2011-2014

Education

Ph.D. Physics, University of Connecticut, Storrs, CT, 2011

B.S. Physics, Middle East Technical University, Ankara, Turkey, 2006

Minor: Mathematics (*Honors*)

Areas of Interest

Theoretical high energy and nuclear physics, mathematical physics, non-perturbative quantum field theory, finite temperature QFT, lattice field theory, heavy ion collisions, large N gauge theories

Publications

Google Scholar (<https://scholar.google.com/citations?user=hvxhLdoAAAAJ&hl=en>)

Inspire-HEP (<http://inspirehep.net/author/profile/G.Basar.1>)

Publication list

[37] X. An, G. Basar, M. Stephanov, and H-U. Yee, 'Relativistic Hydrodynamic Fluctuations', Phys. Rev. C. **100**, 024910 (2019) arXiv:1902.09517 [hep-th],

[36] A. Alexandru, G. Basar, P. Bedaque, H. Lamm and S. Lawrence, 'Finite density QED_{1+1} near Lefschetz thimbles', Phys. Rev. D. **98**, 034506 (2018), arXiv:1807.02027 [hep-lat],

[35] I. Aniceto, G. Basar, and R. Schiappa, 'A Primer on Resurgent Transseries and Their Asymptotics', Physics Reports, **Vol. 809**, Pages 1-135 (2019), arXiv:1802.10441 [hep-th],

[34] A. Alexandru, G. Basar, P. Bedaque, G W. Ridgway and N. C. Warrington, 'Schwinger-Keldysh formalism on the lattice: A faster algorithm and its application to field theory', Phys. Rev. D. **95**, 114501 (2017), arXiv:1704.06404 [hep-lat],

[33] G. Basar, D. Kharzeev, H U. Yee and I. Zadeh, "Interplay of Reggeon and photon in pA collisions", Phys. Rev. D. **95**, 126005 (2017), arXiv:1703.06078 [nuc-th],

[32] A. Alexandru, G. Basar, P. Bedaque and N. C. Warrington, "Tempered transitions between thimbles", Phys. Rev. D. **96**, 034513 (2017), arXiv:1703.02414 [hep-lat],

- [31] G. Basar, G. Dunne and M. Ünsal “Quantum Geometry of Resurgent Perturbative/Nonperturbative Relations”, *JHEP* **1705** (2017) 087, arXiv:1701.06572 [hep-th],
- [30] A. Alexandru, G. Basar, P. Bedaque, G W. Ridgway and N. C. Warrington, “Monte Carlo calculations of the finite density Thirring model”, *Phys. Rev. D.* **95**, 014502 (2016), arXiv:1609.01730 [hep-lat],
- [29] A. Alexandru, G. Basar, P. Bedaque, G W. Ridgway and N. C. Warrington “Study of symmetry breaking in a relativistic Bose gas using the contraction algorithm”, *Phys. Rev. D.* **94**, 045017 (2016), arXiv:1606.02742 [hep-lat],
- [28] A. Alexandru, G. Basar, P. Bedaque, S. Vartak and N. C. Warrington “Monte Carlo study of real time dynamics”, *Phys. Rev. Lett.* **117**, 081602 (2016), arXiv:1605.08040 [hep-lat],
- [27] A. Alexandru, G. Basar, P. Bedaque, G W. Ridgway and N. C. Warrington “Fast Estimator of Jacobians in Monte Carlo Integration on Lefschetz Thimbles”, *Phys. Rev. D.* **93**, 094514 (2016), arXiv:1604.00956 [hep-lat],
- [26] G. Basar, A. Cherman, K. R. Dienes and D. A. McGady, “Modularity and 4D-2D spectral equivalences for large-N gauge theories with adjoint matter”, *JHEP* **1606** (2016) 148, arXiv:1512.07918 [hep-th],
- [25] A. Alexandru, G. Basar, P. Bedaque, G W. Ridgway and N. C. Warrington “Sign problem and Monte Carlo calculations beyond Lefschetz thimbles”, *JHEP* **1605** (2016) 053, arXiv:1512.08764 [hep-lat],
- [24] A. Alexandru, G. Basar and P. Bedaque “A Monte Carlo algorithm for simulating fermions on Lefschetz thimbles”, *Phys. Rev. D.* **93**, 014504 (2016), arXiv:1510.03258 [hep-lat],
- [23] G. Basar and G. V. Dunne, “Hydrodynamics, resurgence and trans-asymptotics”, arXiv:1509.05046 [hep-th], *Phys. Rev. D.* **92**, 125011 (2015)
- [22] G. Basar, A. Cherman, K. R. Dienes and D. A. McGady, “A 4D-2D equivalence for large-N Yang-Mills theory”, arXiv:1507.08666 [hep-th], *Phys. Rev. D.* **92**, 105029 (2015)
- [21] G. Basar, G. V. Dunne, “Resurgence and the Nekrasov-Shatashvili Limit: Connecting Weak and Strong Coupling in the Mathieu and Lamé Systems”, *JHEP* **1502** (2015) 160, arXiv:1501.05671 [hep-th],
- [20] G. Basar, A. Cherman, D. A. McGady “Bose-Fermi Degeneracies in Large N Adjoint QCD”, *JHEP* **1507** (2015) 016, arXiv:1409.1617 [hep-th],
- [19] G. Basar, A. Cherman, D. A. McGady, M. Yamazaki, “Casimir energy of confining large N gauge theories”, *Phys. Rev. Lett.* **114**, 251604 (2015) arXiv:1408.3120 [hep-th],
- [18] G. Basar, A. Cherman, D. A. McGady, M. Yamazaki, “Temperature-reflection symmetry”, *Phys. Rev. D.* **91**, 106004 (2015), arXiv:1406.6329 [hep-th],
- [17] G. Basar, D. Kharzeev, and E. Shuryak “The Magneto-Sono-Luminescence and Photon/Dilepton Production in Heavy Ion Collisions”, *Phys. Rev. C.* **90**, 054903 (2014), arXiv:1402.2286 [hep-ph],
- [16] G. Basar and D. Teaney “A scaling relation between pA and AA Collisions”, *Phys. Rev. C.* **90**, 014905 (2014), arXiv:1312.6770 [nucl-th],
- [15] G. Basar, G. V. Dunne and M. Unsal, “Resurgence theory, ghost-instantons, and analytic continuation of path integrals”, *JHEP* **1310** (2013) 041, arXiv:1308.1108 [hep-th],
- [14] G. Basar, D. E. Kharzeev and I. Zahed, “Chiral and Gravitational Anomalies on Fermi Surfaces”, *Phys. Rev. Lett.* **111**, 161601 (2013), arXiv:1307.2234 [hep-th],
- [13] G. Basar, A. Cherman, D. Dorigoni and M. Unsal, “Large N Volume Independence and an Emergent Fermionic Symmetry”, *Phys. Rev. Lett.* **111**, 121601 (2013), arXiv:1306.2960 [hep-th],
- [12] G. Basar, D. E. Kharzeev and H.-U. Yee, “Triangle anomaly in Weyl semi-metals”, *Phys. Rev. B.* **89**, 035142 (2014), arXiv:1305.6338 [hep-th],
- [11] G. Basar, D. E. Kharzeev and V. V. Skokov, “Conformal anomaly as a source of soft photons in heavy ion collisions”, *Phys. Rev. Lett.* **109**, 202303 (2012), arXiv:1206.1334 [hep-ph], Featured in an editorial published in **APS Synopsis**: <http://physics.aps.org/synopsis-for/10.1103/PhysRevLett.109.202303>
- [10] G. Basar and D. E. Kharzeev, “The Chern-Simons diffusion rate in strongly coupled N=4 SYM plasma in an external magnetic field”, *Phys. Rev. D* **85**, 086012 (2012), arXiv:1202.2161 [hep-th],

- [9] G. Basar, D. E. Kharzeev, H.-U. Yee and I. Zahed, “Holographic Pomeron and the Schwinger Mechanism”, *Phys. Rev. D* **85**, 105005 (2012), arXiv:1202.0831 [hep-th],
- [8] G. Basar, G. V. Dunne and D. E. Kharzeev, ‘Electric dipole moment induced by a QCD instanton in an external magnetic field”, *Phys. Rev. D* **85**, 045026 (2012), arXiv:1112.0532 [hep-th],
- [7] G. Basar, G. V. Dunne, “Gross-Neveu Models, Nonlinear Dirac Equations, Surfaces and Strings”, *JHEP* **1101** 127 (2011), arXiv:1011.3835 [hep-th],
- [6] G. Basar, “A semiclassical analysis of the fluctuation eigenvalues and the one-loop energy of the folded spinning superstring in $AdS_5 \times S^5$ ”, arXiv:1006.5419 [hep-th].
- [5] G. Basar, G. V. Dunne and D. E. Kharzeev, “Chiral Magnetic Spirals”, *Phys. Rev. Lett.* **104**, 232301 (2010), arXiv:1003.3464 [hep-ph], Featured in an editorial published in **APS Synopsis**: <http://physics.aps.org/synopsis-for/10.1103/PhysRevLett.104.232301>,
- [4] G. Basar and G. V. Dunne, “A Gauge-Gravity Relation in the One-loop Effective Action”, *J. Phys. A* **43**, 072002 (2010), arXiv:0912.1260 [hep-th],
- [3] G. Basar, G. V. Dunne and M. Thies, “Inhomogeneous Condensates in the Thermodynamics of the Chiral NJL_2 model”, *Phys. Rev. D* **79**, 105012 (2009), arXiv:0903.1868[hep-th],
- [2] G. Basar and G. V. Dunne, “A Twisted Kink Crystal in the Chiral Gross-Neveu model”, *Phys. Rev. D* **78**, 065022 (2008), arXiv:0806.2659 [hep-th],
- [1] G. Basar and G. V. Dunne, “Self-consistent crystalline condensate in chiral Gross-Neveu and Bogoliubov-de Gennes systems”, *Phys. Rev. Lett.* **100**, 200404 (2008), arXiv:0803.1501 [hep-th].

Book Chapters

- [1] G. Basar and G. V. Dunne, “The Chiral Magnetic Effect and Axial Anomalies”, *Lect.Notes Phys.* **871** (2013) 261-294 ‘Strongly interacting matter in magnetic fields’ (Springer), edited by D. Kharzeev, K. Landsteiner, A. Schmitt, H.-U. Yee, arXiv:1207.4199 [hep-th].

Professional Activities

Referee for

Physical Review Letters, Physical Review D, Journal of High Energy Physics, Physical Review B, Physics Letters B, Annals of Physics, Canadian Journal of Physics, Communications in Nonlinear Science and Numerical Simulation

Schools, Conferences and Workshops

Organizer for

Resurgence in Gauge and String Theory, KITP, Santa Barbara, October 30-November 2, 2017, *Coordinator*

Invited Talks and Lectures

Fire and ice: Hot QCD meets cold and dense matter, Saariselkä, Finland, April 3-7, 2018
 Current Trends in Particle Theory II, Chicago, IL, March 3, 2018
 Towards real-time simulations of quantum field theories and solutions to the sign problem, Keio University, Hiyoshi, Japan September 20, 2017
 Extensive lecture series on Picard-Lefschetz theory and asymptotic expansions, Keio University, Hiyoshi, Japan September 19, 2017
 Resurgence at Kavli IPMU, Kavli IPMU, Kashiwa, Japan, December 12-16, 2016
 KEK Theory Workshop 2016, KEK Theory Center, Tsukuba, Japan, December 6-9, 2016

Resurgence in Gauge and String Theories, Instituto Superior Técnico, Lisbon, Portugal. July 18-22, 2016

Continuous Advances in QCD, University of Minnesota, Minneapolis, May 16-19, 2016

Recent Developments in Semiclassical Probes of Quantum Field Theories, UMass Amherst ACFI, March 17-19, 2016

Magnetic Fields in Strongly Interacting Matter, Utrecht, November 20-23, 2015

Geometry and Physics 2015, Advances in Perturbation Theory and Feynman Amplitudes, Perimeter Institute, Waterloo, ON May 25-30, 2015

QCD Chirality Workshop, UCLA, January 21-23, 2015

QCD vacuum and matter under strong magnetic field II, IHEP, Beijing, October 15-27, 2014

Strongly Coupled Systems Away From Equilibrium, Simons Center for Geometry and Physics, February 24-28, 2014

Quantum Anomalies and Hydrodynamics: Applications to Nuclear and Condensed Matter Physics, Simons Center for Geometry and Physics, February 17-21, 2014

P- and CP-odd Effects in Hot and Dense Matter 2012, Brookhaven National Laboratory, Upton, NY, June 25-27, 2012

Other Select Conference Presentations

Quark Matter 2017, Chicago, IL, February 5-11, 2017 (*speaker*)

Quark Matter 2014, Darmstadt, May 19-24, 2014 (*speaker*)

High Energy Physics in the LHC Era., Valparaíso, Chile, December 16-20, 2013 (*speaker*)

2013 Fall Meeting of the APS Division of Nuclear Physics, Newport News, VA, October 23-26, 2013 (*speaker*)

Quark Matter 2012, Washington D.C., August 11-18, 2012 (*speaker*)

Sixth International Conference on Quarks and Nuclear Physics, Ecole Polytechnique, Palaiseau, Paris, April 16-20, 2012 (*speaker*)

Teaching

University of Connecticut

Teaching Assistant, September 2006 - January 2011

Assisted graduate level course "Methods of Theoretical Physics"

Instructed various undergraduate level laboratory courses

Tutored in Physics Learning Resource Center (PLRC)

Middle East Technical University

Undergraduate Assistant, September 2005 - January 2006

Tutored undergraduate physics students